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BOW FOR A CONVERTIBLE VEHICLE

The invention concerns a convertible vehicle according to the introductory clause of Claim 1 and a movable roof according to the introductory clause of Claim 10.

It is well known that in convertible vehicles with flexible roof coverings, e.g., textile or plastic roof coverings, the roof covering can be stretched over bows that extend essentially transversely to the vehicle. In this regard, there are vehicles with multipart bows, which have, for example, a middle section made of a first material and lateral mounting fixtures made of other, e.g., more flexurally stiff, materials, with which the bows are held on lateral frame parts of a roof frame.

If the lateral mounting fixtures and the middle section are screwed together, the heads of the screws extend relatively far into the interior and thus constitute a source of annoyance and a potential hazard to the occupants of the vehicle, especially in the case of low-lying sports cars with little head clearance, or require the installation of a roof-liner, which covers the

screw heads but also rubs against them and is thus subject to wear. Moreover, precisely with this type of vehicle it is desirable to design the bows as thin as possible in order to limit the head clearance of the occupants as little as possible. However, this makes it more difficult for the screws to engage firmly, since the thin component can accommodate only a short length of thread.

The objective of the invention is to optimize the bows in a convertible vehicle with a roof covering that is at least partly flexible and is supported from below by one or more bows.

The invention achieves this objective with a convertible vehicle with the features of Claim 1 and with a movable vehicle roof with the features of Claim 10. Advantageous refinements of the invention are described in dependent Claims 2 to 9.

In the design of the invention, the fastening devices, e.g., screws, bolts, rivets, or the like, do not extend beyond the bow. This increases head clearance and reduces the risk of injury.

The desired thin shape of the bow is actually advantageous for the design of the invention: Especially if the middle section of the bow has an essentially elliptical cross-sectional shape with a major axis at least approximately parallel to the plane of the roof covering in the vicinity of each bow, it is

possible to use long fastening means in this plane parallel to the roof covering without these fastening means protruding beyond the outer contour of the bow.

If, as is advantageous, the fastening means can be inserted through a retaining channel and if, in the installed position, they are covered by a recessed roof covering fastener, then they are visually completely concealed, inaccessible to unintentional loosening, and free of projecting edges or corners. A roof liner is unnecessary.

The retaining element channel also makes it possible for the roof covering fastener to be fed laterally into, and removed laterally from, the middle section of the bow. If suitable insertion regions are provided in at least one of the mounting fixtures, this lateral insertion and removal is also possible in an advantageous way even after the bows have been assembled, which simplifies replacement of the roof covering.

Further advantages and features of the invention are explained below with reference to the specific embodiment of the object of the invention that is illustrated in the drawings.

-- Figure 1 shows a convertible vehicle in a schematic, perspective view that is broken off at the front and below, with the roof completely closed and with a flexible roof covering that extends over the whole extent of the roof except for the

rear window.

-- Figure 2 shows an individual bow in an oblique rear view...

-- Figure 3 shows the detail III in Figure 2.

-- Figure 4 shows a section along line IV-IV in Figure 3 with the roof covering and its fastening also shown.

-- Figure 5 shows a section along line V-V in Figure 3 with the roof covering and its fastening also shown.

The convertible vehicle 1 of the invention can be either a two-seater or a convertible vehicle with a larger interior with, e.g., two rows of seats one behind the other.

It has a movable roof, designated as a whole by reference number 2, and, in the illustrated example, a flexible roof covering 4, that extends over the whole extent of the roof 2 except for the rear window 3. However, this is not required. It would also be possible for only a part of the roof 2 to be flexible and for another part of the roof to be formed by one or more rigid panel sections. In its closed position (Figure 1), the roof 2 is locked on a windshield frame 5.

To maintain the shape of the roof covering 4, it is supported from below in one or often several places by one or more bows 6, 7, that extend transversely to the direction of vehicle travel F. The bows 6, 7 are in turn secured to lateral

frame parts 8 of the roof 2 either rigidly or in a way that allows them to pivot.

For this purpose, each bow 6, 7 comprises a middle section 9, which is made of a first material and is realized, for example, as an extruded aluminum section, and lateral mounting fixtures 10, which are made of a different material, for example, as aluminum sand castings. The mounting fixtures 10 hold the bows 6, 7 on the frame parts 8.

As an example, two bows 6, 7 are shown in possible positions as broken lines in Figure 1. The view of a single bow 6 in Figure 2 is seen approximately from the direction of arrow 11 in Figure 1, i.e., essentially from the rear in the direction of vehicle travel F.

The rear surfaces 12 of the bows 6, 7 are not necessarily exactly perpendicular to the direction of vehicle travel F. Instead, because of the inclination of the bows 6, 7, these surfaces can also be at a certain angle to the horizontal plane, as can be seen especially in the case of bow 6. These rear surfaces have a continuous retaining channel 13. The retaining channel 13 is designed to receive the bead 14 or similar thickened area of a fastener 15 for the roof covering, in this case a patch of material, and has an approximately C-shaped cross section (Figure 5).

Near the lateral edges, the C-shape widens out (Figure 4), so that fastening means 16 can be inserted there transversely to the direction in which the retaining channel 13 extends. In the embodiment illustrated here, the fastening means 16 consist of two screws on each side of the vehicle. They pass through the middle section 9 and engage in the ends of the mounting fixture 10, which is retained positively in the middle section 9. The screws 16 can be self-tapping. No additional means of securing the middle section 9 and the mounting fixtures 10 to each other are required.

In their connected positions, the screws 16 are at least approximately parallel to the planes 17 and 18 of the roof covering 4 in the area of each bow 6, 7 and thus do not project beyond the area 19 of the bow 6, 7 that extends the farthest into the passenger compartment.

The bows 6, 7 have a cross section with an elliptical shape or similarly flattened shape (an almost rectangular or trapezoidal outer contour is another possibility). The major axis 20 of the ellipse is exactly parallel or almost parallel to the plane 17, 18 of the roof covering 4 in the area of each bow 6, 7. The fastening means 16 can thus be inserted in the direction of the major axis 20 of the bow 6, 7 (Figure 4), so that the fastening means can be long enough to get a good grip

with their threads, for example, without having to project beyond the outer contour of each bow 6, 7. As Figure 4 shows, furthermore, the heads 21 of the screws 16 are recessed so far that they are completely inside the bow 6, 7, where they are also covered by the bead 14 and the patch of material 15 and are thus inaccessible.

The cross sections of the mounting fixtures 10 are adapted to the outer contour of the middle section 9 by providing them with a similarly flattened shape. Therefore, they extend only slightly into the interior of the vehicle, so that here, too, head clearance above and to the side is maximized.

After the assembly of the bows 6, 7, the projecting, thickened bead 14 of the roof covering fastener 15 is fed laterally into the retaining channel 13 along an insertion region 22 located on at least one of the mounting fixtures 10 (shown here on both mounting fixtures). The recessed insertion regions 22 widen towards the longitudinal center plane of the vehicle and thus facilitate the insertion of the roof covering fastener 15. The inserted bead 14 is then held securely in the C-shaped channel 13 and cannot be pulled out (Figure 5).

At the end opposite the bead 14, the patch of material 15 is securely attached to the outer roof covering 4 by welding or adhesive bonding, for example. A roof liner can be additionally

installed (not shown) but is not necessary to cover any fastening means 16.

The invention can be used both in vehicles with a roof 2 that is manually moved and in vehicles with a roof 2 that can be moved fully automatically or semiautomatically.